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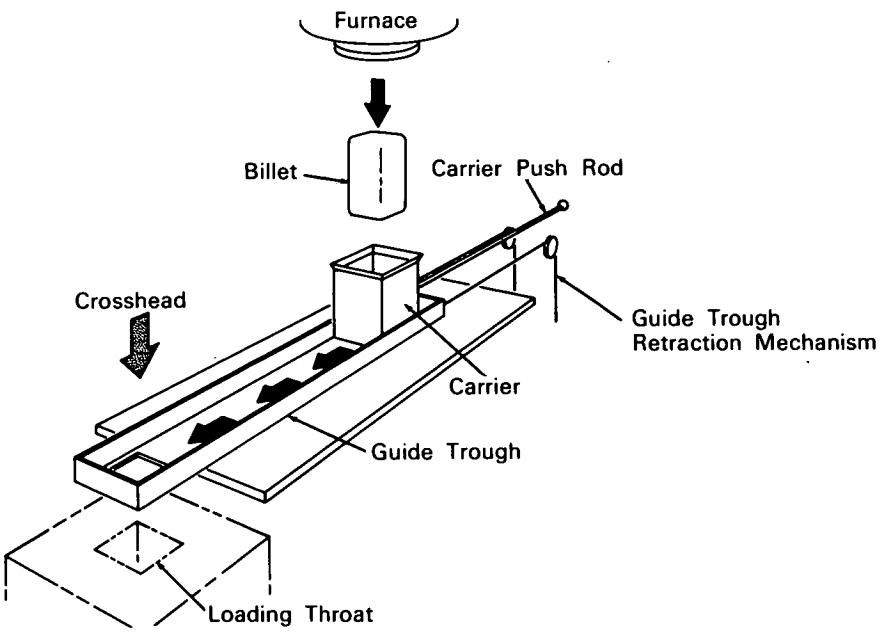
NASA TECH BRIEF

Rapid Billet Loader Aids Extrusion of Refractory Metals



The problem: To reduce the time required for handling hot metal billets when they are transferred from a heating furnace to an extrusion press. Both high-temperature metals (2,500 to 4,000°F working temperature) and certain low-temperature alloys have a narrow range of hot-working temperatures and tend to lose heat rapidly. Conventional transfer methods for handling hot metal depend on slow motorized devices or slow-acting gravity systems.

The solution: A combination gravity and manually powered rapid billet loader that accomplishes the complete cycle from furnace to closing of the extrusion press within 3 seconds.

How it's done: The loader is a simple slide-delivery device positioned between the furnace and the extrusion press. For efficient work handling, the furnace is as near as possible to the press but on a higher level than the loading throat of the press.

A guide trough slides on a horizontal work surface and can be positioned directly below the furnace outlet. A carriage to hold the hot billet has an open top and bottom to permit loading and unloading. Rods or pulleys can be worked to move the carriage in the guide trough. At one end of the work surface there is an opening which leads to the press loading throat.

(continued overleaf)

The billet, brought to working temperature in the furnace, is allowed to fall from the furnace outlet into the carriage positioned directly below. The sides of the carriage and solid floor of the guide trough cradle the billet as the carriage is rapidly moved (manually) to the loading throat of the extrusion press. An opening in the guide trough floor allows the billet to pass from the carriage into the throat of the extrusion press at the end of the carriage excursion. Simultaneously with the beginning of the extrusion press cycle, the guide trough is manually withdrawn by a pulley mechanism.

The complete cycle, from furnace to extrusion press, can be accomplished in as little as 3 seconds. Delivery from furnace to carrier is normally accomplished in 1 second. Rapidity of operation has two advantages: heat loss in the billet is minimized, as well as any adverse effects of excessive heat-transfer to the handling mechanism. In addition, the extremely simple mechanism should have a very modest maintenance requirement.

Notes:

1. Some configurations of billets can be handled more reliably than others. Billets having large ratios of length to diameter can be expected to enter both the carrier and extrusion cavity more reliably (without cocking) under free-fall conditions than billets having small ratios of length to diameter.
2. This device is highly reliable and simple to operate. As constructed, the carrier is moved manually but could be converted to power operation. If the mechanism is power driven, the transfer device should be equipped with a safety interlock to prevent malfunctioning and consequent damage.
3. Elimination of manual handling of the extremely hot billets removes a serious safety hazard. The lateral transfer device is an adaptation of the slide mechanism often used for orienting parts in a mechanized manufacturing process.

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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